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Studies of the Flora of Mustang, Central Nepal 1. The Genus *Juncus* (Juncaceae)

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Fourteen species of the genus *Juncus* are recognized in the Mustang District, Central Nepal. *Juncus mustangensis*, a new species, is distinguished from similar species by the short creeping rhizome, the absence of auricles and cauline leaves, and the basal leaves with a single groove on the adaxial side. *Juncus trachyphyllus* Miyam. & H.Ohba, previously known from Sichuan, SW. China, was discovered in Nepal for the first time. This species is similar to *J. allioides* Franch. and *J. glaucoturgidus* Noltie, but differs in having grooved basal leaves, the blades U-shaped in cross section, and scabrid leaves and culms.

Key words: flora, *Juncus*, Mustang, Nepal, new species.

The flora and vegetation of the Mustang District, Central Nepal are remarkably different from other districts in Nepal (Stainton 1972). John Stainton, William Sykes and John Williams collected a considerable number of botanical specimens from the Mustang District in 1954. Since then the so-called lower Mustang southward from Kagbeni was visited by several botanists, including Sasuke Nakao, Hideo Tabata, Keshab R. Rajbhandari, M. A. Farille (Rajbhandari 2002). Hiroo Kanai, Hideaki Ohba, Keshab K. Rajbhandari, Michio Wakabayashi, Mitsuo Suzuki, and Shinobu Akiyama botanized in the lower Mustang in 1983. Since then, members of the Society of Himalayan Botany have been planning to study the flora. In 2000, with financial support from the Midori-Ikusei-Zaidan Foundation, the Komeri Co. Ltd., Japan, Ohba and Iokawa began a research project on the floristics of the Mustang District. Once a year since then (since 2000) research teams have been dispatched to the lower and upper Mustang (Iokawa 2001, Noshiro and Amano 2002). In 2002 Futoshi Miyamoto, Hiroshi Ikeda, Mahendra N. Subedi, Shinobu Akiyama, Nobuhira Kurosaki and others surveyed the flora along the route from Kagbeni to Lo-Mangthang (Miyamoto and Ikeda 2003).

This series of articles aims to provide systematic treatments of some taxonomically difficult groups and also reports on new or critical taxa found in the Mustang District in preparation for the Mustang flora (Ohba ms. in preparation)

The genus *Juncus* is highly diverse in

areas with a moist climate in the Himalayan region. In fact, species of *Juncus* have been found sporadically in isolated small ponds and bogs in the otherwise dry Mustang District. One of the authors (F. M.) focused on *Juncus* during field research in 2002 and has examined specimens of the genus in A, BM, CAL, KATH, TI and UPS collected in the Mustang District by various botanists. In this report we recognize 14 species of *Juncus*, two of which are a new species and a new record to Nepal, respectively. Ten of the 14 species were collected by Stainton, Sykes and Williams in 1954. During the most recent field trip one of the authors (F. M.) collected only six species.

In previous reports on the regional floras of Nepal, 21 species of *Juncus* were recorded from Ganesh Himal, Central Nepal (Miyamoto 1999), and 23 species from the Hinku and Hunku Valleys in Eastern Nepal (Miyamoto 2000). The climatic and edaphic conditions of both of those regions (Ohba and Ikeda 1999, 2000) are much more favorable for *Juncus* than the Mustang region. The fewer species appear to reflect the drier environment, and additional species are unlikely to be found.

Key to the species of *Juncus* in Mustang, Central Nepal

1. Bracteoles on pedicel just below flower paired .... 5. *J. bufonius*
1. Bracteoles on pedicel absent
  2. Sheathing floral bract present on peduncle; inflorescence usually with several capitula
    3. Stamens longer than perianth segments
      4. Leaves flat .... 6. *J. clarkei*
      4. Leaves terete .... 7. *J. concinnus*
    3. Stamens shorter than perianth segments
      4. Perianth segments dark brown .... 12. *J. sphacelatus*
      4. Perianth segments green .... 2. *J. articulatus*
  2. Sheathing floral bract absent on peduncle; inflorescence with one or two capitula
    3. Stamens shorter than perianth segments .... 11. *J. rohtangensis*
    3. Stamens longer than perianth segments
      5. Cauline leaf always present
        6. Cross section of blades rounded or oval .... 1. *J. allioides*
        6. Cross section of blades U-shaped
          7. Leaves and clum surface smooth .... 3. *J. benghalensis*
          7. Leaves and clum surface scabrid .... 14. *J. trachyphyllus*
      5. Cauline leaf always absent
        6. Stigmas very short, somewhat capitate.............. 4. *J. brachystigma*
        6. Stigmas distinct
          7. Cross section of blades U-shaped
            8. Rhizomes stoloniform................. .... 3. *J. benghalensis*
            8. Rhizomes short creeping .... 9. *J. mustangensis*
          7. Cross section of blades rounded or ovate
            8. Lowest bract longer than inflorescence .... 8. *J. kingii*
            8. Lowest bract shorter than inflorescence
              9. Seeds appendages less than 0.1 mm long .... 10. *J. perpusillus*
              9. Seeds appendages 0.8–1.1 mm long .... 13. *J. thomsonii*

1. **Juncus allioides** Franch. in Nouv. Arch. Mus. Hist. Nat., ser. 2, **10**: 99 (1887). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978), specimen cited: Stainton et al. 1750.

Specimens examined (from Mustang District). Thorong La, E. of Muktinath, 14500 ft. (G. Miehe 645, 9 Sept. 1977, BM); Taglung, S. of Tukucha, Kali Gandaki, 12000 ft. (Stainton, Sykes & Williams 1750, 7 Nov. 1954, A); Namdo, N. of Mustang, 16500 ft. (Stainton, Sykes & Williams 2335, 9 Aug. 1954, A, BM, CAL); Jargeng Khola, 15000–16000 ft. (D. G. Lowndes 1349, 7 Aug. 1950, BM); Taglung, Kali Gandaki, 12000 ft. (Stainton, Sykes & Williams 1750, 11 Jul. 1954, BM); Tukucha, Kali Gandaki, 10500 ft. (Stainton, Sykes & Williams, Sykes & Williams 1880a, 18 Jul. 1954, BM).

2. **Juncus articulatus** L., Sp. Pl. 327 (1753). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978).

Specimens examined (from Mustang District). Pura, Muktinath, 12000 ft. (Stainton, Sykes & Williams 2031, 27 Jul. 1954, A). Phalyak-Sangda Pass–Pongio Kharka (a Kharka between Sangda Pass and Sangda village), 28°49′0.7″N, 83°44′28.1″E, 3340 m (Miyamoto et al. 20210008, 9 Aug. 2002, TI); Ghami-Ghar Gompa, 29°04′34″N, 83°52′53.8″E, 3690 m (Miyamoto et al. 20210123, 18 Aug. 2002, TI).

Juncus articulatus, with green perianth, pale green filaments and ovaries, pale yellow anthers, and white stigma, is similar to *J. prismatocarpus* R.Br. and *J. wallichianus* Laharpe.

Marshy places by streams.

3. **Juncus benghalensis** Kunth, Enum. Pl. **3**: 360 (1841). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978), specimen cited: Stainton et al. 1942.

Specimens examined (from Mustang District). Larjung, S. of Tukucha, Kali Gandaki, 11500 ft. (Stainton, Sykes & Williams 1942, 13 Jul. 1954, A, CAL); Mustang, around Ommang (Hoshino et al. 9662106, 1 Aug. 1996, TI); Around Sangda Pass, 28°52′29.5″N, 83°43′9.4″E, 4700 m (Miyamoto et al. 20210077, 12 Aug. 2002, TI).

Grassy alpine slopes.

4. **Juncus brachystigma** Sam. in Hand.-Mazz., Symb. Sin. **7**: 1236 (1936). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978).

Specimens examined (from Mustang District). Tukucha, Kali Gandaki, 12000 ft. (Stainton, Sykes & Williams 1170a, 15 Jun. 1954, BM).

5. **Juncus bufonius** L., Sp. Pl. 328 (1753). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978).

Specimens examined (from Mustang District). Ghami-Ghar Gompa, 29°04′34″N, 83°52′53.8″E, 3690 m (Miyamoto et al. 20210118, 18 Aug. 2002, TI).

Marshy places by streams.

6. **Juncus clarkei** Buchenau in Bot. Jahrb. Syst. **6**: 210 (1885).

Specimen examined (from Mustang District). Tukucha, Kali Gandaki, 10500 ft. (Stainton, Sykes & Williams 1114, 14 Jun. 1954, CAL).

7. **Juncus concinnus** D.Don, Prodr. Fl. Nepal. 44 (1825). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978).

Specimens examined (from Mustang District). Tukcha, Kali Gandaki, 10000 ft. (Stainton, Sykes & Williams 7482, 26 Aug. 1954, A, BM); Kali Gandaki, N. Dhumpu, 7800 ft. (G. Miehe 82, 12 Jul. 1977, BM); near Lumsum, 7500 ft. (Stainton, Sykes & Williams 3516, 17 Jul. 1954, A, BM); Samargaon, N. of Tukucha, 15500 ft. (Stainton, Sykes & Williams 7295, 15 Aug. 1954, CAL).

8. **Juncus kingii** Rendle in J. Bot. **44**: 45 (1906). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 84 (1978), specimen cited: Stainton et al. 1880.

Specimen examined (from Mustang District). Tukucha, Kari Gandaki, 10500 ft. (Stainton, Sykes & Williams 1880, 18 Jul. 1954, BM).

9. **Juncus mustangensis** Miyam. & H.Ohba, sp. nov. [Fig. 1]

Ex similitudine *Juncus benghalensis* Kunth et *J. sherei* Miyam. & H.Ohba, ab utroque rhizomatibus brevioribus repentibus, exauriculatis, caulis aphyllis, basalibus foliis in pagina adaxiali singulariter canaliculatis distinctus.

Perennial, caespitose, 7–20 cm tall. Rhizomes very short horizontally creeping, 0.4–0.7 mm in diam. Culms erect, terete, 0.3–0.8 mm in diam., grass green, surface smooth, cross section rounded. Cataphylls inconspicuous. Leaves terete, with an adaxial groove, cross section of the blades U-shaped, auricle absent, grass green; basal leaves 1 or 2 (–3) per culm, 4–8 cm long including sheath, 0.7–1.5 mm in diam., sheaths 0.5–3 cm long; cauline leaf absent. Inflorescence a

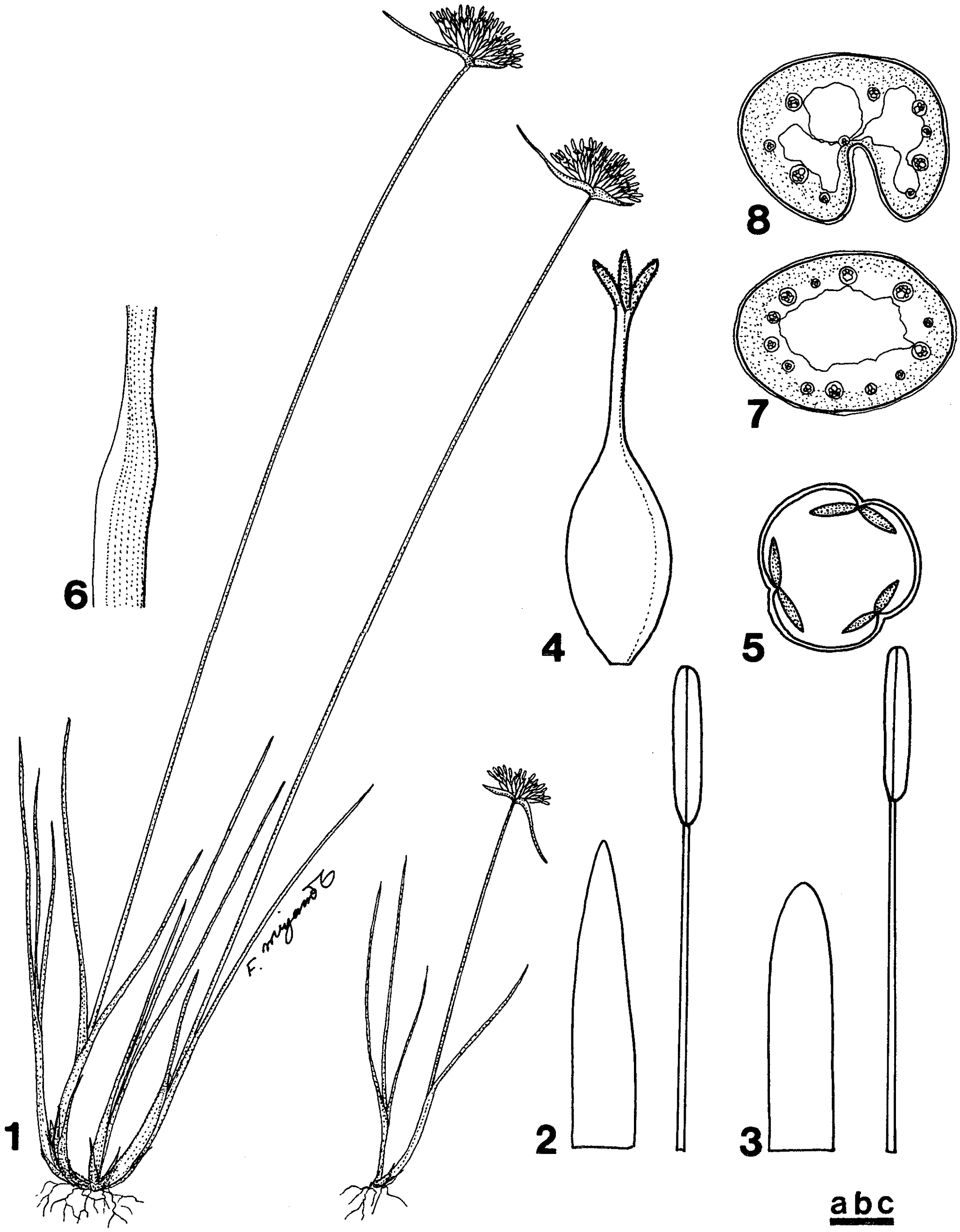

Fig. 1. *Juncus mustangensis* Miyam. & H.Ohba (Holotype). 1: Habit. 2: Outer perianth and stamen. 3: Inner perianth and stamen. 4: Ovary. 5: Cross section of ovary. 6: Auricle of basal leaf. 7: Cross section of culm. 8: Cross section of basal leaf. Scales: a (1 cm) for 1. b (1 mm) for 2, 3, 4, 5 and 6. c (2 mm) for 7 and 8.

single head of 7–14 flowers, subglobose, 1–1.8 cm in diam., creamy white. Lowest bract longer than inflorescence, linear, terete, cross section rounded, 1–1.8 cm long, grass green; floral bracts scarious, lanceolate to linear-lanceolate, 2–5 mm long, 1–1.5 mm wide; sheathing bract absent. Flowers 0.6–0.9 cm long, pedicellate, 1.5–2 mm wide, pedicels 0.5–1 mm long. Perianth segments lanceolate to linear-lanceolate, outer perianth segments slightly longer than inner ones, 3.5–5 mm long, 0.8–1 mm wide, creamy white. Stamens 6, longer than perianth, 5–8 mm long; filaments 3–5 mm long; anthers linear elliptic, yellow, 1.5–2.5 mm long, 2 times as long as filaments. Pistil 5.5–7 mm long, 1–1.5 mm wide; stigmas 0.8–1 mm long; style 1.5–2 mm long. Capsule oblong, cuspidate, cross section trigonous, as long as perianth, chestnut brown, 4–5 mm long, 2–2.5 mm wide. Seeds unknown.

Type: Nepal. Dhaulagiri zone, Mustang district, between Sangda Pass and Phalyak, 28°51′40′′N, 83°44′41′′E, 3870 m (F. Miyamoto, N. Kurosaki, S. Akiyama, H. Ikeda, M. Tsusaka & M. N. Subedi 20210100, 13 Aug. 2002, TI-holotype, KATH-isotype).

Juncus mustangensis is characterized by the short creeping rhizome, the absence of auricles and cauline leaves, and basal leaves with a single adaxial groove. It is similar to *J. benghalensis* Kunth and *J. sherei* Miyam. & H.Ohba, but *J. benghalensis* has stoloniform rhizomes and leaves with rounded auricles; *J. sherei* has basal leaves with a single groove each on the adaxial and abaxial surfaces. *Juncus mustangensis* is also similar to *J. kingii* Rendle, which has stoloniform rhizomes and basal leaves without grooves.

Juncus mustangensis was collected on moist cliffs along the gorge between Sangda Pass and Phalyak on the west side of Kali Gandaki River.

10. **Juncus perpusillus** Sam. in Hand-Mazz. Symb. Sin. **7**: 1237 (1936).

Specimen examined (from Mustang District). Tukucha, Kali Gandaki, 12000 ft. (Stainton, Sykes & Williams 1170, 15 Jun. 1954, UPS).

11. **Juncus rohtangensis** Goel & Aswal in Indian J. Forest. **10**: 262, f. 1–8 (1987).

Specimens examined (from Mustang District). Muktinath, 3962 m (Stainton, Sykes & Williams 1451, 26 Jun. 1954, BM, UPS).

12. **Juncus sphacelatus** Decne. in Jacquem., Voy. Inde **4**: 172, t. 172 (1835). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 85 (1978), specimen cited: Stainton et al. 2313.

Specimens examined (from Mustang District). Namdo, N. of Mustang, 17000 ft. (Stainton, Sykes & Williams 2291, 8 Aug. 1954, A, CAL, UPS); loc. cit., 16500 ft. (Stainton, Sykes & Williams 2313, 9 Aug. 1954, BM, UPS).

13. **Juncus thomsonii** Buchenau in Bot. Zeitung (Berlin) **25**: 148 (1867). H.Hara, Stearn & Williams, Enum. Flow. Pl. Nepal **1**: 85 (1978).

Specimens examined (from Mustang District). Near Kagbeni, 3500 m (O. Namikawa 431, 3 Oct. 1958, KYO); Kali Gandaki, S. E. Tini, 9000 ft. (D. McCosh 154, 29 May 1964, BM); Tukucha, Kaligandaki, 12000 ft. (J. D. A. Stainton 7096, 15 Jun. 1974, BM); Muktinath, 28°49′N, 83°55′E, 3700 m (J. E. M. Arnold 278, 26 Aug. 1954, BM); Syangboche–Ghami, 29°00′16′′N, 83°50′48.8′′E, 3680 m (Miyamoto et al. 20210112, 17 Aug. 2002, TI)

Marshy places by streams.

14. **Juncus trachyphyllus** Miyam. & H.Ohba in J. Jpn. Bot. **72**: 164, f. 2 (1999).

Specimen examined (from Mustang District). North-west of Lo-Manthang, 29°14′50.3′′N, 83°54′28′′E, 4530 m (Miyamoto et al. 20210166, 21 Aug. 2002 TI).

Alpine slopes.

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References

Iokawa Y. 2001. A botanical expedition to the Mustang Area, central Nepal in 2000. Newsletter of Himalayan Botany, no. 28: 13–17.

Miyamoto F. 1999. Juncaceae. *In*: Ohba H. and Ikeda H. (eds.), A Contribution to the Flora of Ganesh Himal, Central Nepal, pp. 66–69. The University Museum, The University of Tokyo, Tokyo.

—— 2000. Juncaceae. *In*: Ohba and Ikeda H. (eds.), The Flora of Hinku and Hunku Valleys, East Nepal, no. 6, pp. 235–241. The University Museum, The University of Tokyo, Tokyo.

—— and Ikeda H. 2003. Japan-Nepal Botanical Expedition to Upper Mustang in 2003. Newsletter of Himalayan Botany, no. 32, in press.

Noshiro S. and Amano M. 2002. Japan-Nepal botanical expedition to Upper Mustang in 2001. Newsletter of Himalayan Botany, no. 29: 1–7.

Ohba H. and Malla S. B. 1988. Research team members and itineraries. The Himalayan Plants, vol. **1**, pp. 1–10. University of Tokyo Press, Tokyo.

—— and Ikeda H. 1999. Outline of the geography and flora. *In*: Ohba H. and Ikeda H. (eds.), A Contribution to the Flora of Ganesh Himal, Central Nepal, p. 1. The University Museum, The University of Tokyo, Tokyo.

—— and —— 2000. *In*: Ohba and Ikeda H. (eds.), Outline of the geography and flora. The Flora of Hinku and Hunku Valleys, East Nepal, p. 1. The University Museum, The University of Tokyo, Tokyo.

Rajbhandari K. R. 2002. Flora of Nepal: 200 years' march. *In*: Noshiro S. and Rajbhandari K. R. (eds.), Himalayan Botany in the Twentieth and Twenty-first Centuries, pp. 76–93. The Society of Himalayan Botany, Tokyo.

Stainton J. D. A. 1972. Forests of Nepal. 181 pp. John Murray Ltd., London.

宮本 太[a]，大場秀章[b]，M. N. スベディ[c]：**ネパール中部ムスタン地方の植物相研究 1. イグサ属植物**

ムスタン地方のイグサ属植物を分類学的に検討した．その結果，14種のイグサ属植物が採集されていることが判った．そのうち10種は Stainton, Sykes & Williams によって採集された．著者のひとり宮本は，2002年に現地を調査したが採集できたのは 6 種であった．そのうちの 1 種は *J. benghalensis*, *J. sherei* および *J. kingii* に近縁であるが，根茎が短く這うこと，葉耳および茎葉を欠くこと，基部葉の向軸側に一本の溝を持つことで明らかに異なることから新種として，*Juncus mustangensis* と名付けた．また中国・四川省より記載された *J. trachyphyllus* Miyam. & H.Ohba がムスタン上部地域で発見された．四川省以外ではこれまで見出されていなかったものである．

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